# STAR Trigger Level 0 Configurations– Run 2006

Last update: 12th May 2006

## TCU Input Bit Lists

| Bit | Set 1 – Minimum Bias & Central Research<br>l1_ld301_ctb_zdc.rbt<br>Used in these Tier1 files:<br>040126 | Set 2 – Primary Data Taking<br><br>l1_ld301_2006.rbt<br>Used in these Tier1 files:<br>060307<br>060313<br>060316<br>060318<br>060323<br>060326<br>060328<br>060509 | Set 3 – Pedestal and Test Data Taking<br>l1_ld301_pedestal_2006.rbt<br>Used in these Tier1 files:<br>060316_pedestal<br>060509_pedestal |
|---|---|---|---|
| 0 | CTB Multiplicity > th0 | MTD trigger | Req. bit 0 |
| 1 | CTB Multiplicity > th1 | FPD1 | Req. bit 1 |
| 2 | CTB Multiplicity > th2 | FPD2 | Req. bit 2 |
| 3 | BBC TAC diff in window | EMC Total Energy Sum | Detector ID bit 0 |
| 4 | ZDC TAC diff in window | J/Ψ trigger | Detector ID bit 1 |
| 5 | BBC $East_{small}$ ADC> th | BEMC HT.TP>th | Detector ID bit 2 |
| 6 | BBC $West_{small}$ ADC> th | BEMC HT>th2 | Detector ID bit 3 |
| 7 | ZDC East ADC > th0 | BEMC Jet Patch: 1 | Unused |
| 8 | ZDC West ADC > th0 | BEMC Jet Patch: 2 | Unused |
| 9 | ZDC East TAC in window | EEMC HT.TP>th | Unused |
| 10 | ZDC West TAC in window | EEMC HT>th2 | Unused |
| 11 | ZDC E+W attenuated ADC sum > th | EEMC Jet Patch: 1 | Unused |
| 12 | Zero Bias bit | EEMC Jet Patch: 2 | Unused |
| 13 | Blue bunch filled | Prescaled minimum bias | Minimum Bias |
| 14 | Yellow bunch filled | Minimum bias | Zero Bias |
| 15 | Special Trigger Flag (Off) | Zero Bias | Random Bit |

NOTES:

- Please see the documentation for the individual RBT files on the STAR Trigger Web Pages at http://www.star.bnl.gov/STAR/html/trg_l/TSL/index.html in the Software section for a description of what these bits mean.
- In Set 1 if the Special Trigger Flag is ON then the TCU input bits have the following definitions:

| Bit | Special Requests |
|---|---|
| 0 | Req. bit 0 |
| 1 | Req. bit 1 |
| 2 | Req. bit 2 |
| 3 | Detector ID bit 0 |
| 4 | Detector ID bit 1 |
| 5 | Detector ID bit 2 |
| 6 | Detector ID bit 3 |
| 7 | Random Bit |
| 8 | |
| 9 | |
| 10 | |
| 11 | |
| 12 | |
| 13 | |
| 14 | |
| 15 | Special Trigger Flag (On) |

**Tier1 Files**

041026

| | |
|---|---|
| BBC | Good ADC values are summed and the sums are compared to thresholds for East and West separately.<br>The fastest good TAC is found for East and West separately, and their difference is calculated.<br>"Killer Bits" are used in the ADC sum logic. |
| ZDC | ADC values are compared to thresholds.<br>A window is put on each TAC value, and in parallel the TAC difference is calculated<br>"Killer Bits" are used in the ADC-threshold and TAC-window logic<br>The SMD data is just recorded |
| CTB | The ADC values are all summed.<br>The UPC-topology logic runs in parallel |
| BEMC/EEMC | Jet patch energy sums and high towers are compared to 3 thresholds.<br>The results are combined for the Barrel and Endcap separately.<br>J/Ψ detection logic is based on the West half of the barrel only.<br>The back-to-back detection logic is not implemented<br>The adjacent jet patch logic can use the Barrel, Endcap or both. |
| FPE/FPW | High-tower algorithms are now in use: 3 thresholds are applied to each ADC.<br>The results are combined for East and West separately. |
| L1 | Set 1 - Minimum Bias and Central Research (see TCU Input Bits List above) |

060307

| | |
|---|---|
| BBC | LUTS at input to final VTX DSM (VT201) are changed from 1-to-1 maps to files that are read in. |
| ZDC | This allows the user to re-map the TAC difference bits to a range useful for the scalers. Otherwise, same as 040126 |
| MTD | ADC values are compared to a threshold.<br>The threshold bits are combined to indicate a particle passing through all 3 layers of the detector.<br>NOTE: A bug was fixed in this algorithm: the MTD data is now passed from MD001 to channel 4 of ZD101, instead of channel 2, to be consistent with the way this system is actually cabled. |
| CTB | Same as 040126 |
| BEMC/EEMC | High towers, trigger patch energies and jet patch energy sums are compared to 3 thresholds.<br>The result for each trigger patch is combined with its associated high tower.<br>The results are combined for the Barrel and Endcap separately.<br>J/Ψ detection logic is based on the barrel only.<br>The jet patch energies are summed to give the total energy in the Barrel, Endcap and the full calorimeter.<br>The 3 total energy measurements are each compared to a threshold |
| FPE/FPW | A sum algorithm is used to measure the total energy in each FPD-East module and each FPD++ module. The energies are compared to thresholds |
| L1 | Set 2 – Primary Data Taking (see TCU Input Bits List above) |

060313

| | |
|---|---|
| BBC | Same as 060307 |
| ZDC | |
| MTD | Same as 060307 |
| CTB | Same as 040126 |
| BEMC/EEMC | Same as 060307 |
| FPE/FPW | The 2006 version of the FP201 algorithm is installed to process the new FPD++ data. |
| L1 | Set 2 – Primary Data Taking (see TCU Input Bits List above) |

| | |
|---|---|
| | NOTE: The size of the minimum bias prescale register was increased from 5 to 8 bits. There were no changes to any of the input or output data bits. |

060316

| | |
|---|---|
| BBC | Same as 060307 |
| ZDC | |
| MTD | Same as 060307 |
| CTB | The last 8 DSMS in this system have been removed leaving just the first 8 |
| BEMC/EEMC | The input to EM201 from EE101 is zeroed out in the EM201 LUT |
| FPE/FPW | The FPE North-South layer 0 DSMS have switched from a 15-channel to a 16-channel sum algorithm. |
| L1 | Same as 060313 |

060316 – Pedestal/Test Version

| | |
|---|---|
| BBC | Same as 060307 |
| ZDC | |
| MTD | Same as 060307 |
| CTB | Same as 060316 |
| BEMC/EEMC | Same as 060307 (i.e. nothing is zeroed out) |
| FPE/FPW | Same as 060316 |
| L1 | Set 3 – Pedestal and Test Data Taking (see TCU Input Bits List above) |

060318 – NOTE: This Tier1 file is being used as a testing ground. It is being modified to fix problems as they are identified. The table below lists the current state of this Tier1 file.

| | |
|---|---|
| BBC | Same as 060307 |
| ZDC | |
| MTD | Same as 060307 |
| CTB | Same as 060316 |
| BEMC/EEMC | EE101 is no longer zeroed out at the input to EM201, the layer-2 EMC DSM<br>Bits 0-8 of channel 2 have been set to 5 (i.e. the expected pedestal value) in the input to EE101. This corresponds to bits 16-24 out of EE002, which is one of the jet patch energies<br>The 4 MSB of channel 4 have been zeroed out of the EE101 input. This corresponds to the TP and HT.TP bits of the EE004 output<br>Bits 10 and 11 of channel 3 have been zeroed out in the input to BE101. This corresponds to bits 26 and 27 out of BE003, which are the HT bits from the second trigger patch. |
| FPE/FPW | FW004 has been switched from the algorithm that sums 2 groups of 8 channels to the old one (still used by FE004) that sums 2 groups of 7 channels.<br>FE101 and FE102 have switched to the masked sum already used by FW101 and FW102 |
| L1 | Same as 060313 |

060323

| | |
|---|---|
| BBC | Same as 060307 |
| ZDC | |
| MTD | Same as 060307 |
| CTB | Same as 060316 |
| BEMC/EEMC | The HT bits from the second patch in BE003 are no longer zeroed out at the input to BE101. Otherwise, same as final version of 060318 |
| FPE/FPW | Same as final version of 060318 |
| L1 | Same as 060313 |

060326

| | |
|---|---|
| BBC | ZDC and Small-tile BBC TAC difference bits are swapped on the cable that goes from the |
| ZDC | "Vertex" DSM board (VT201) to the Scaler Source Patch Panel, otherwise same as 060307 |
| MTD | Same as 060307 |
| CTB | Same as 060316 |
| BEMC/EEMC | Same as 060323 |
| FPE/FPW | Same as 060323 |
| L1 | Same as 060313 |

060328

| | |
|---|---|
| BBC | Same as 060307 |
| ZDC | |
| MTD | Same as 060307 |
| CTB | Same as 060316 |
| BEMC/EEMC | Same as 060307, i.e. nothing is zeroed out anymore |
| FPE/FPW | Same as 060323 |
| L1 | Same as 060313 |

060509

| | |
|---|---|
| BBC | Same as 060307 |
| ZDC | |
| MTD | Same as 060307 |
| CTB | Same as 060313, i.e. last 8 DSMs have been restored |
| BEMC/EEMC | Same as 060307 |
| FPE/FPW | FPE Top/Bottom DSMs (FE008,9,10,11 and FE102) have been removed |
| L1 | FE102 outputs have been zeroed out at the input to FP201 (channels 2 and 3), otherwise same as 060313 |

060509 – Pedestal/Test Version

| | |
|---|---|
| BBC | Same as 060307 |
| ZDC | |
| MTD | Same as 060307 |
| CTB | Same as 060313, i.e. last 8 DSMs have been restored |
| BEMC/EEMC | Same as 060307 |
| FPE/FPW | FPE Top/Bottom DSMs (FE008,9,10,11 and FE102) have been removed |
| L1 | Same as 060316_Pedestal |